

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,211,512 B1
APPLICATION NO. : 09/483881
DATED : May 1, 2007
INVENTOR(S) : Ahn et al.

Page 1 of 16

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 1, above
"2,842,438 A 7/1958 Saarivirta et al. 75/153" insert

-- 1,254,987	1/1918	Cooper
1,976,375	10/1934	Smith, J. K. 148/11.5
2,244,608	6/1941	Cooper, H. S. 75/138 --.

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 2, below
"2,842,438 A 7/1958 Saarivirta et al. 75/153" insert

-- 3,147,110	9/1964	Foerster 75/122.5
3,337,334	8/1967	Fenn et al. 75/150
3,506,438	4/1970	Krock et al. 75/208
3,548,915	10/1970	Richmond et al. 164/68
3,548,948	12/1970	Richmond et al. 164/68
3,687,737	8/1972	Krock et al. 148/2
3,832,456	8/1974	Kobetz et al. 423/645
3,932,226	1/1976	Klatskin et al. 204/16
3,954,570	6/1976	Shirk et al. 204/15
4,022,931	5/1977	Black et al. 427/91
4,029,377	6/1977	Guglielmi 339/19
4,065,330	12/1977	Masumoto et al. 148/31.55
4,101,855	7/1978	Drapeau 335/106
4,158,719	6/1979	Frantz 428/567
4,213,818	* 7/1980	Lemons et al. 438/719
4,233,066	11/1980	Sundin et al. 75/142
4,314,594	2/1982	Pfeifer et al. 148/108
4,386,116	5/1983	Nair et al. 427/99
4,389,429	6/1983	Soclof 438/492
4,423,547	1/1984	Farrar et al. 29/571
4,561,173	12/1985	Te Velde 438/619 --.

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 4, below
"4,565,157 A 1/1986 Brors et al." insert

-- 4,574,095	3/1986	Blaum et al. 427/53.1
4,670,297	6/1987	Lee et al. 427/91
4,709,359	11/1987	Loftin 367/155 --.

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 5, below
"4,762,728 A 8/1988 Keyser et al. 427/38" insert

-- 4,788,082	11/1988	Schmitt 427/248.1
4,824,544	4/1989	Mikalesen et al. --.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 6, below

"4,847,111 A	7/1989	Chow et al.	427/38" insert
-- 4,857,481	8/1989	Tam et al.	437/182
4,931,410	6/1990	Tokunaga et al.	437/189
4,933,743	6/1990	Thomas et al. --.	

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 8, below

"4,962,058 A	10/1990	Cronin et al.	437/187" insert
-- 4,996,584	2/1991	Young et al.	357/71
5,019,531	5/1991	Awaya et al.	437/180 --.

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 10, below

"5,043,299 A	8/1991	Chang et al."	insert
-- 5,045,635	9/1991	Kaplo et al.	174/35 GC
5,071,518	12/1991	Pan --.	

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 11, below

"5,084,412 A	1/1992	Nakasaki	437/189" insert
-- 5,100,499	3/1992	Douglas	156/635 --.

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 12, below

"5,130,274 A	7/1992	Harper et al.	437/195" insert
-- 5,148,260	9/1992	Inoue et al.	357/67
5,149,615	9/1992	Chakravorty et al.	430/313 --.

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 15, below

"5,180,687 A	1/1993	Mikoshiba et al."	insert
-- 5,227,658	7/1993	Beyer et al.	257/522
5,231,036	7/1993	Miyauchi et al.	--.

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 16, below

"5,231,056 A	7/1993	Sandhu	437/200" insert
-- 5,232,866	8/1993	Beyer et al.	437/62
5,240,878	8/1993	Fitzsimmons et al.	437/187
5,243,222	9/1993	Harper et al.	257/774
5,256,205	10/1993	Schmitt III et al.	118/723
5,268,315	12/1993	Prasad et al.	437/31
5,308,440	5/1994	Chino et al.	156/664
5,324,683	6/1994	Fitch et al.	437/65
5,324,684	6/1994	Kermani et al.	437/95
5,334,356	8/1994	Baldwin et al.	422/133
5,336,914	8/1994	Andoh	257/368 --.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title page, in field (56), under "U.S. Patent Documents", in column 1, line 17, below

"5,348,811 A	9/1994	Nagao et al."	insert
-- 5,354,712	10/1994	Ho et al.	437/195
5,356,672	10/1994	Schmitt III et al.	427/446 --.

On the Title page, in field (56), under "U.S. Patent Documents", in column 2, line 1, above

"5,413,687 A	5/1995	Barton et al.	204/192.14" insert
-- 5,374,849	12/1994	Tada	
5,384,284	1/1995	Doan et al.	437/190
5,399,897	3/1995	Cunningham et al.	257/467
5,401,680	3/1995	Abt et al.	
5,408,742	4/1995	Zaidel et al.	29/846 --.

On the Title page, in field (56), under "U.S. Patent Documents", in column 2, line 2, below

"5,413,687 A	5/1995	Barton et al.	204/192.14" insert
-- 5,413,962	5/1995	Lur et al.	437/195
5,424,030	6/1995	Takahashi	420/473
5,426,330	6/1995	Joshi et al.	257/752
5,442,237	8/1995	Hughes et al.	257/759
5,444,015	8/1995	Aitken et al.	437/182 --.

On the Title page, in field (74), in "Attorney, Agent, or Firm", in column 2, line 1, delete "Lunberg" and insert -- Lundberg --, therefor.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 2, below

"5,447,887 A	9/1995	Filipiak et al.	437/200" insert
-- 5,457,344	10/1995	Bartelink	257/737
5,470,789	11/1995	Misawa	437/190
5,470,801	11/1995	Kapoor et al.	437/238
5,476,817	12/1995	Numata	437/195
5,485,037	1/1996	Marrs.	257/712
5,495,667	* 5/1996	Earnworth et al.	29
5,506,449	4/1996	Nakano et al.	257/758
5,510,645	4/1996	Fitch et al.	257/522
5,529,956	6/1996	Morishita	437/195
5,534,731	7/1996	Cheung	257/759
5,538,922	7/1996	Cooper et al.	437/195
5,539,060	7/1996	Tsunogae et al.	525/338
5,539,227	7/1996	Nakano	257/276 --.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 3, below

"5,572,072 A	11/1996	Lee" insert	
-- 5,578,146	11/1996	Grant et al.	148/437
			--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 5, below

"5,609,721 A	3/1997	Tsukune et al.	156/646.1" insert
-- 5,625,232	4/1997	Numata et al.	257/758
5,633,200	5/1997	Hu	
5,635,253	6/1997	Canaper	427/437
			--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 6, below

"5,654,245 A	8/1997	Allen	438/629" insert
-- 5,662,788	9/1997	Sandhu et al.	205/87
5,667,600	9/1997	Grensing et al.	148/437
			--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 7, below

"5,670,420 A	9/1997	Choi	437/189" insert
-- 5,674,787	10/1997	Zhao et al.	437/230
5,675,187	10/1997	Numata et al.	257/758
5,679,608	10/1997	Cheung et al.	437/195
5,681,441	10/1997	Svendsen et al.	205/114
5,693,563	12/1997	Teong	
5,695,810	12/1997	Dubin et al.	427/96
5,705,425	1/1998	Miura et al.	437/182
			--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 8, below

"5,719,089 A	2/1998	Cherng et al.	438/637" insert
-- 5,719,410	2/1998	Suehiro et al.	257/77
5,719,447	2/1998	Gardner	
5,725,689	3/1998	Nishida et al.	148/320
5,739,579	4/1998	Chiang et al.	257/635
			--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 9, below

"5,763,953 A	6/1998	Iijima et al.	257/762" insert
-- 5,780,358	7/1998	Zhou	438/645
5,785,570	7/1998	Bruni	445/52
5,789,264	8/1998	Chung	
5,792,522	8/1998	Jin et al.	427/575
5,792,706	8/1998	Michael et al.	438/626
5,801,098	9/1998	Fiordalice et al.	438/653
5,814,557	9/1998	Venkataraman et al.	438/622
5,821,168	10/1998	Jain	438/692
			--.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 10, below
"5,824,599 A 10/1998 Schacham-Diamond et al. 438/678" insert

-- 5,840,625	11/1998	Feldner		
5,852,871	12/1998	Khandros	29/843	
5,858,877	1/1999	Dennison et al.	438/700	
5,880,018	03/1999	Boeck	438/619	--

On page 2, in field (55), under "U.S. Patent Documents", in column 1, line 11, below

"5,891,797 A 4/1999	Farrar	438/619" insert	
-- 5,880,018 4/1999	Havemann et al.	438/674	
5,893,752 4/1999	Zhang et al.	438/687	--

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 12, below

"5,895,740 A 4/1999	Chien et al.	430/313" insert	
-- 5,897,370 4/1999	Joshi et al.	438/632	
5,899,740 5/1999	Kwon		
5,900,668 5/1999	Wollesen	257/522	--

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 13, below

"5,907,772 A 5/1999	Iwasaki	438/253" insert	
-- 5,911,113 6/1999	Yao et al.	438/649	
5,913,147 6/1999	Dubin et al.	438/687	
5,925,930 7/1999	Farnworth et al.	257/737	
5,930,596 7/1999	Klose et al.	438/98	
5,930,669 7/1999	Uzoh	438/627	
5,932,928 8/1999	Clampitt	257/758	
5,933,758 8/1999	Jain	438/687	
5,937,320 A * 8/1999	Andricacos et al.	438/614	
5,940,733 8/1999	Beinglass et al.	438/655	--

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 15, below

"5,962,923 A 10/1999	Xu et al.	257/774" insert	
-- 5,968,327 10/1999	Kobayashi et al.		
5,968,333 10/1999	Nogami et al.	205/184	
5,969,422 10/1999	Ting et al.	257/762	--

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 16, below

"5,972,179 A 10/1999	Chittipeddi et al.	204/192.17" insert	
-- 5,972,804 10/1999	Tobin et al.	438/786	
5,976,710 11/1999	Sachdev et al.	428/620	
5,981,350 11/1999	Geusic et al.	438/386	
5,985,759 11/1999	Kim et al.	438/653	--

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PATENT NO. : 7,211,512 B1
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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 17, below

"5,989,623 A	11/1999	Chen et al.	427/97" insert	
-- 5,994,776	11/1999	Fang et al.	257/758	--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 18, below

"6,001,736 A	12/1999	Kondo et al."	insert	
-- 6,004,884	12/1999	Abraham	438/714	
6,008,117	12/1999	Hong et al.	438/629	--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 19, below

"6,015,465 A	1/2000	Kholodenko et al.	118/719" insert	
-- 6,015,738	1/2000	Levy et al.	438/275	--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 20, below

"6,017,820 A	1/2000	Ting et al."	insert	
-- 6,022,802	2/2000	Jang	438/656	
6,028,362	2/2000	Omura		
6,025,261	2/2000	Farrar et al.	438/619	
6,030,877	2/2000	Lee et al.	438/381	
6,030,895	2/2000	Joshi et al.		
6,037,248	3/2000	Ahn	438/619	
6,054,172	4/2000	Robinson et al.	427/97	
6,057,226	5/2000	Wong	438/623	
6,065,424	5/2000	Shachem-Diamond et al.	118/696	
6,069,068	5/2000	Rathore et al.	438/628	--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 21, below

"6,071,810 A	6/2000	Wade et al.	438/635" insert	
-- 6,075,278	6/2000	Farrar	257/522	
6,075,287	6/2000	Ingraham et al.		
6,091,136	7/2000	Jiang et al.	257/676	
6,091,475	7/2000	Ogino et al.	349/149	
6,100,193	8/2000	Suehiro et al.	438/685	
6,103,320	8/2000	Matsumoto et al.		
6,120,641	10/2000	Stevens et al.	456/345.22	
6,121,126	9/2000	Ahn et al.	438/602	
6,126,989	10/2000	Robinson et al.	427/97	--.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 25, below

"6,140,234 A 10/2000 Uzoh et al." insert
-- 6,140,456 10/2000 Lee et al. 528/196
6,143,641 11/2000 Kitch 438/618
6,143,655 11/2000 Forbes et al. --.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 26, below

"6,143,646 A 11/2000 Wetzel et al. 438/637" insert
-- 6,143,671 11/2000 Sugai
6,150,214 11/2000 Kaeriyama
6,150,261 11/2000 Hsu et al. 438/640 --.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 28, below

"6,153,507 A 11/2000 Mikagi et al. 438/618" insert
-- 6,159,769 12/2000 Farnworth et al. 438/108
6,159,842 12/2000 Chang et al. 438/622
6,169,024 1/2001 Hussein --.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 29, below

"6,171,661 B1 1/2000 Zheng et al. 427/535" insert
-- 6,174,804 1/2001 Hsu --.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 31, below

"6,183,564 B1 2/2001 Reynolds et al. 118/719" insert
-- 6,187,656 2/2001 Lu et al. 438/592 --.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 33, below

"6,197,688 B1 3/2001 Simpson 4380/678" insert
-- 6,197,181 * 3/2001 Chen 205/123
6,204,065 3/2001 Ochiai 436/66 --.

On page 2, in field (56), under "U.S., Patent Documents", in column 1, line 34, below

"6,207,222 B1 3/2001 Chen et al. 427/678" insert
-- 6,207,553 5/2001 Buynoski et al. 438/622
6,207,558 3/2001 Singhbi et al. 438/648
6,208,016 3/2001 Farrar 257/643 --.

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Page 8 of 16

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 35, below

"6,211,073 B1	4/2001	Ahn et al.	438/653" insert
-- 6,211,049	4/2001	Farrar	438/597
6,211,561	4/2001	Zhao	257/522
6,214,719	4/2001	Nag	438/619
6,215,186	4/2001	Konecni et al.	
6,218,282	4/2001	Buynoski	438/619
6,221,763	4/2001	Gilton	438/643
			--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 36, below

"6,232,219 B1	5/2001	Blalock et al.	438/637" insert
-- 6,245,658	6/2001	Buynoski	438/619
6,245,662 B1 *	6/2001	Naik et al.	438/622
6,246,118	6/2001	Buynoski	257/758
			--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 38, below

"6,251,781 B1	6/2001	Zhou et al.	438/637" insert
-- 6,258,707	7/2001	Uzoh	--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 39, below

"6,265,311 B1	7/2001	Hautala et al.	438/680" insert
-- 6,265,811	7/2001	Takeuchi et al.	
6,268,276	7/2001	Chan et al.	438/619
6,268,277	7/2001	Bang	438/619
			--.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 40, below

"6,271,592 B1	8/2001	Kim et al.	257/751" insert
-- 6,277,263	8/2001	Chen	205/182
6,281,585	8/2001	Bothra	257/758
6,284,656	9/2001	Farrar	438/687
6,287,954	9/2001	Ashley	438/622
6,288,442	9/2001	Farrar	257/678
6,288,447	9/2001	Amishiro et al.	
6,288,905	9/2001	Chung	361/771
6,290,833	9/2001	Chen	205/182
			--.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 42, below

"6,303,505 B1 10/2001 Ngo et al." insert
-- 6,323,543 11/2001 Jiang et al. 257/676
6,323,553 11/2001 Hsu et al. 257/751
6,326,303 12/2001 Robinson et al. 38/678
6,329,279 12/2001 Lee 438/619
6,342,448 1/2002 Lin et al. 438/687
6,358,842 3/2002 Zhou et al. 438/633
6,358,849 3/2002 Havemann et al. 438/689
6,359,328 3/2002 Dunbin 257/62 --.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 43, below

"6,365,511 B1 4/2002 Kizilyalli et al." insert
-- 6,368,954 4/2002 Lopatin et al. 438/622
6,368,966 4/2002 Krishnamoorthy 438/687 --.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 44, below

"6,372,622 B1 * 4/2002 Tan et al." insert
-- 6,376,370 4/2002 Farrar 438/678
6,383,920 5/2002 Wang et al. 438/639 --.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 45, below

"6,387,542 B1 * 5/2002 Kozlov et al." insert
-- 6,399,489 6/2002 M'Saad et al. 438/680 --.

On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 46, below

"6,403,481 B1 * 6/2002 Matsuda et al." insert
-- 6,403,481 6/2002 Matsuda et al. 438/687
6,417,094 7/2002 Zhao et al.
6,428,673 8/2002 Ritzdorf et al. 205/84
6,429,120 8/2002 Ahn et al. 438/635
6,486,533 11/2002 Krishnamoorthy et al. 257/586
6,492,266 12/2002 Ngo et al.
6,508,920 1/2003 Ritzdorf et al. 204/194
6,518,198 2/2003 Klein 438/758
6,552,432 4/2003 Farrar 257/751
6,563,219 5/2003 Ireland et al. 257/758
6,565,729 5/2003 Chen et al. 205/82
6,589,863 7/2003 Usami
6,614,099 9/2003 Farrar 257/643
6,632,345 10/2003 Chen 205/182
6,638,410 10/2003 Chen et al. 205/182

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On page 2, in field (56), under "U.S. Patent Documents", in column 1, line 46, (cont'd)

6,664,197	12/2003	Stevens et al.	438/754
6,743,716	6/2004	Farrar	438/652
6,756,298	6/2004	Ahn et al.	438/635
2001/0002333	5/2001	Huang et al.	438/637
2001/0054771	12/2001	Wark et al.	257/786
2002/0014646	2/2002	Tsu et al.	257/296
2002/0028552	3/2002	Lee et al.	438/243
2002/0096768	7/2002	Joshi	257/750
2002/0109233	8/2002	Farrar	257/762
2002/0167089 A1	11/2002	Ahn et al.	257/762
2003/0034560 A1	2/2003	Matsuse et al.	
2004/0206308 A1	10/2004	Ahn et al.	
2005/0023697 A1	2/2005	Ahn et al.	--.

On page 3, in field (56), under "Other Publications", in column 1, line 37, delete "electrless" and insert -- electroless --, therefor.

On page 3, in field (56), under "Other Publications", in column 1, line 37, delete "Si02" and insert -- SiO₂ --, therefor.

On page 3, in field (56), under "Other Publications", in column 1, line 43, delete "on" and insert -- of --, therefor.

On page 3, in field (56), under "Other Publications", in column 2, line 22, delete "mangetron" and insert -- magnetron --, therefor.

On page 3, in field (56), under "Other Publications", in column 2, line 52, delete "Si02" and insert -- SiO₂ --, therefor,

On page 3, in field (56), under "Other Publications", in column 2, line 64, below "Thin Solid Films, 318, pp. 234-238, (1998)." insert
-- Abe, K. , et al., "Sub-half Micron Copper Interconnects Using Reflow of Sputtered Copper Films", VLSI Multilevel Interconnection Conference, (June 25- 27, 1995), 308-311.

AMERICAN SOCIETY FOR METALS Metals Handbook, 8th Edition. Vol. 8, Metals Park, Ohio, (1973), 300-302.

AMERICAN SOCIETY FOR METALS, Metals Handbook, Ninth Edition. Vol. 2, Properties and Selection: Nonferrous Alloys and Pure Metals, ASM Handbook Committee, (eds.), American Society for Metals, Metals Park, OH, (1989), 157, 395.

UNITED STATES PATENT AND TRADEMARK OFFICE
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INVENTOR(S) : Ahn et al.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 3, in field (56), under "Other Publications", in column 2, line 64, (cont'd)

AMERICAN SOCIETY FOR METALS, "Phase Diagrams", Metals Handbook, 10th Ed. Vol. 3, Metals Park, Ohio, (1992).

Anonymo, "Formation of Conductors at Variable Depths – Using Differential Photomask, Projecting Images into Insulator by Reactive Ion Etching, Selectively Filling Images with Conductor", Research Disclosure, Disclosure No. RD 291015, Abstract, (July 10, 1988), 1 page.

Chang, J. Y. C. , et al. "Large Suspended Inductors on Silicon and their use in a 2-urn CMOS RF Amplifier", IEEE Electron Device Letters. 14(5), (May 1993), 246-248.

Craig, J. D., "Polyimide Coatings", Packaging. Electronic Materials Handbook, Vol. 1. ASM International Handbook Committee (eds.), ASM International, Materials Park, OH, (1989), 767-772.

DOW COMPANY, "SILK' D Semiconductor Dielectric Resin", <http://www.dow.com/silk/odf/618-00317.pdf>, (Unknown), 2 pages.

DOW COMPANY, "SILK' J Semiconductor Dielectric Resin", <http://www.dow.com/silk/a df/618-00316.4df> (unknown), 2 pages.

Dudzinski, N., et al., "The Youngs Modulus of Some Aluminum Alloys", J. Institute of Metals, Vol. LXXIV, (1947-48), 291-314.

Ernst, et al., "Growth Model for Metal Films on Oxide Surface: Cu on ZnO(0001)-O", Physical Review B, 47, (May 15, 1993), 13782-13796.

Fleming, J. G., et al., "Use Of Air Gap Structures To Lower Level Intralevel Capacitance", Proceedings of the 1997 Dielectrics for ULSI Multi-level Interconnect Conference, (1997), 140.

Grill, A. , et al., "Low dielectric constant films prepared by plasma-enhanced chemical vapor deposition from tetramethvisilane", Journal of Applied Physics, 85(6), (1999), 3314-3318.

Hirao, S., et al., "A Novel Copper Reflow Process Using Dual Wetting Layers", 1997 Symposium on VLSI Technology, Digest of Technical Papers, (1997), 57-58.

Izaki, M., et al., "Characterization of Transparent Zinc Oxide Films Prepared by Electrochemical Reaction", Journal of the Electrochemical Society, 144. (June 1997), 1949-1952.

Jayaraj, K., et al., "Low Dielectric Constant Microcellular Foams", Proceedings from the Seventh Meeting of the DuPont Symposium on Polymides in Microelectronics, September 1996, 474-501.

Jin, C., et al., "Porous Xerogel Films as Ultra-low Permittivity Dielectrics for ULSI Interconnect Applications", Conference Proceedings ULSI XII -1997. Materials Research Society (1997), 463-469.

Kang, H. K., et al., "Grain Structure and Electromigration Properties of CVD CU Metallization" Proceedings of the 10th International VLSI Multilevel Interconnection Conference June 8-9, 1993, 223-229.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 3, in field (56), under "Other Publications", in column 2, line 64, (cont'd)

Kirk, Raymond E., Kirk-Othmer Concise Encyclopedia of Chemical Technology, Grayson, M., (ed.), John Wiley & Sons, Inc., New York, NY, (1985), 433-435, 926-938.

Martin, Steven J., "The Invention and Development of a Low-Dielectric Constant Polymer for the Fabrication of Integrated Circuit Interconnect", Seminar - Department of Chemical Engineering - North Carolina State University, (April 9, 2001), 1 page.

MIN, J., "Metal-organic atomic-layer deposition of titanium-silicon-nitride films", Applied Physics Letters, 75(11), (1999), 1521-1523.

Miyake, T., et al., "Atomic Hydrogen Enhanced Reflow of Copper" Applied, Physics Letters. 70(10), (1997), 1239-1241.

Palleau, J., et al., "Refractory Metal Encapsulation in Copper Wiring", Advanced Metallization for Devices and Circuits-Science, Technology and Manufacturability, Materials Research Society Symposium Proceedings, 337, (April 1994), 225 – 231.

Park, C. W., et al., "Activation Energy for Electromigration in Cu Films", Applied Physics Letters, 59(2), (July 6, 1991), 175-177.

Quan, Y. C., et al., "Polymer-like Organic Thin Films Deposited by Plasma Enhanced Chemical Vapor Deposition Using the Para-xylene Precursor as Low Dielectric Constant Interlayer Dielectrics for Multilevel Metallization", Japanese Journal of Applied Physics. Vol. 38. Part1, No. 3A 1999, 1356-1358.

Ramos, T, et al., "Nanoporous Silica for Dielectric Constant Less Than 2", Conference Proceedings ULSI XII - 1997 Materials Research Society, (1997), 455-461.

Rossnagel, S. M., "Magnetron Sputter Deposition of Interconnect Applications", Conference Proceedings, ULSI XI, (1996), 227-232.

Shacham-Diamand, Y., "100 nm Wide Copper Lines Made by Selective Electroless Deposition", Journal of Micromechanics and Microengineering. 1, (March 1991), 66-72.

Shieh, B., et al., "Air-Gap Formation During IMD Deposition to Lower Interconnect Capacitance", IEEE Electron Device Letters, 19(1), (1998), 16-18.

Singer, Ferdinand L., "Strength of Materials", Harper & Brothers. New York, (1951), 229-32.

Srivatsa, A. R., et al., "Jet Vapor Deposition: an Alternative to Electrodeposition", Surface Engineering. 11, (1995), 75-77.

Tao, J., et al., "Electromigration Characteristics of Copper Interconnects", IEEE Electron Devices Letters, 14(5), (May 1993), 249-251.

Ting, C. H., "Methods and Needs for Low K Material Research", Materials Research Society Symposium Proceedings. Volume 381, Low-Dielectric Constant Materials -- Synthesis and Applications in Microelectronics, Lu, T.M., et al., (eds.), San Francisco, CA, (April 17-19, 1995), 3-17.

Uchida, Y., et al., "A Fluorinated Organic-Silica Film with Extremely Low Dielectric Constant", Japanese Journal of Applied Physics. Vol. 38 Part1 No. 4B, (April 1999), 2368-2372.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 3, in field (56), under "Other Publications", in column 2, line 64, (cont'd)

Ueda, T., et al., "A novel Air Gap Integration Scheme for Multi-level Interconnects using Self-aligned Via Plugs" Symposium on VLSI Technology Digest of Technical Papers (1998), 46-47.

Wang, X. W., et al., "Highly Reliable Silicon Nitride Thin Films Made by Jet Vapor Deposition", Japanese Journal of Applied Physics. Vol. 34, Putt No. 2B, (February 1995), 955-958.

Wolf, S., et al., "Silicon Processing for the VLSI Era. Vol. 1 – Process Technology", Lattice Press, Sunset Beach, CA, (1986), 514-538.

Wolf, S., "Chapter 4: Multilevel-Interconnect Technology for VLSI and ULSI", Silicon Processing for the VLSI Era, Vol. 2 Process Integration, Lattice Press, Sunset Beach, CA, (1990), 176-297.

Zhang, F., et al., "Nanoglass/sup TM/ E copper damascene processing for etch, clean, and CMP", Proceedings of the IEEE 2001 International Interconnect Technology Conference, (2001), 57-9.

AMERICAN SOCIETY FOR METALS, "Properties and Selection: Nonferrous Alloys and Pure Metals", Metals Handbook. 9th ed., Vol. 2, Metals Park, Ohio, (1979), Table of Contents.

Van Horn, K. R., "Aluminum Vol. III Fabrication and Finishing", American Society for Metals, Metals Park, OH, (1967), 468.

Murarka, S. P., et al., Topper Metallization for ULSI and Beyond", Critical Reviews in Solid State and Materials Sciences 20 2 (1995), 87-124.

Bai, G., "Copper Interconnection Deposition Techniques and Integration", 1996 Symposium on VLSI Technoloav, Digest of Technical Papers, (1996), pp. 48-49.

Bhansali, S., et al., "Selective seeding of copper films on polyimide-patterned silicon substrate, using ion implantation", Sensors and Actuators A: Physical, 52 1 March 1996, 126-131. --.

In column 3, line 66, after "invention" delete "." and insert -- ; --, therefor.

In column 4, line 22, delete "unhoped" and insert -- undoped --, therefor.

In column 11, line 52, delete "copending" and insert -- co-pending --, therefor.

In column 13, line 54, in Claim 1, before "seed" insert -- discontinuous --.

In column 13, line 56, in Claim 1, after "on" delete "the substrate" and insert -- a semiconductor substrate, wherein individual elements of the discontinuous seed layer are substantially isolated from each other --, therefor.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 13, line 63, in Claim 1, after "layer" insert -- and exposed portions of the seed layer --.

In column 14, line 9, in Claim 5, before "seed" insert --discontinuous --.

In column 14, line 10, in Claim 5, delete "(Cu)having" and insert -- (Cu) having --, therefor.

In column 14, line 10, in Claim 5, before "discontinuous" delete "a".

In column 14, lines 10–11, in Claim 5, delete "island structure on the" and insert -- islands on a semiconductor --, therefor.

In column 14, line 12, in Claim 5, delete "technique;" and insert -- technique, wherein the discontinuous islands are substantially electrically isolated from each other; --, therefor.

In column 14, line 16, in Claim 5, after "layer;" insert -- and --.

In column 14, lines 20-21, in Claim 6, delete "having a discontinuous island structure includes a discontinuous island structure" and insert -- includes discontinuous islands --, therefor.

In column 14, line 25, in Claim 7, delete "vias, wherein the number of copper vias form" and insert -- structures, wherein copper structures are formed --, therefor.

In column 14, line 28, in Claim 8, delete "vias" and insert -- structures --, therefor.

In column 14, line 35, in Claim 10, after "first" insert -- discontinuous --.

In column 14, line 36, in Claim 10, delete "substrate;" and insert -- semiconductor substrate, wherein individual elements of the first discontinuous seed layer are substantially electrically isolated from each other; --, therefor.

In column 14, line 40, in Claim 10, after "of" delete "or".

In column 14, line 45, in Claim 10, after "second" insert -- discontinuous --.

In column 14, line 46, in Claim 10, after "(Pd)" insert -- or --.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 14, line 65, in Claim 13, after "first" delete "number of".

In column 14, line 66, in Claim 13, delete "form" and insert -- are formed --, therefor.

In column 15, line 14, in Claim 17, before "seed" insert -- discontinuous --.

In column 15, line 14, in Claim 17, delete "substrate" and insert -- semiconductor substrate, wherein individual elements of the first discontinuous seed layer are substantially electrically isolated from each other --, therefor.

In column 15, line 19, in Claim 17, delete "plating;" and insert -- plating to a top surface of the first photoresist layer; --, therefor.

In column 15, line 20, in Claim 17, after "second" insert -- discontinuous --.

In column 15, line 28, in Claim 17, after "third" insert -- discontinuous --.

In column 15, line 38, in Claim 18, after "fourth" insert -- discontinuous --.

In column 16, line 3, in Claim 25, after "first" insert -- discontinuous --.

In column 16, line 4, in Claim 25, before "substrate" insert -- semiconductor --.

In column 16, line 5, in Claim 25, delete "process;" and insert -- process, wherein individual elements of the first discontinuous seed layer are substantially electrically isolated from each other; --, therefor.

In column 16, line 11, in Claim 25, after "plating" insert -- to a top surface of the first photoresist layer --.

In column 16, line 12, in Claim 25, after "second" insert -- discontinuous --.

In column 16, line 19, in Claim 25, after "third" insert -- discontinuous --.

In column 16, line 50, in Claim 31, after "first" insert -- discontinuous --.

In column 16, line 51, in Claim 31, delete "substrate;" and insert -- semiconductor substrate, wherein individual elements of the first discontinuous seed layer are substantially electrically isolated from each other; --, therefor.

In column 16, line 57, in Claim 31, after "second" insert -- discontinuous --.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 16, line 65, in Claim 31, after "third" insert -- discontinuous --.

In column 17, line 3, in Claim 31, after "layer;" delete "and".

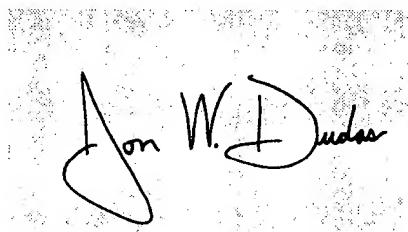
In column 17, line 6, in Claim 31, after "fourth" insert -- discontinuous --.

In column 18, line 11, in Claim 37, delete "wherein the further includes" and insert -- further including --, therefor.

In column 18, line 14, in Claim 37, after "and" insert -- on --.

Signed and Sealed this

Twenty-first Day of August, 2007



JON W. DUDAS
Director of the United States Patent and Trademark Office